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## **Species Profile: Loggerhead Shrike (*Lanius ludovicianus*) on Military Installations in the Southeastern United States**

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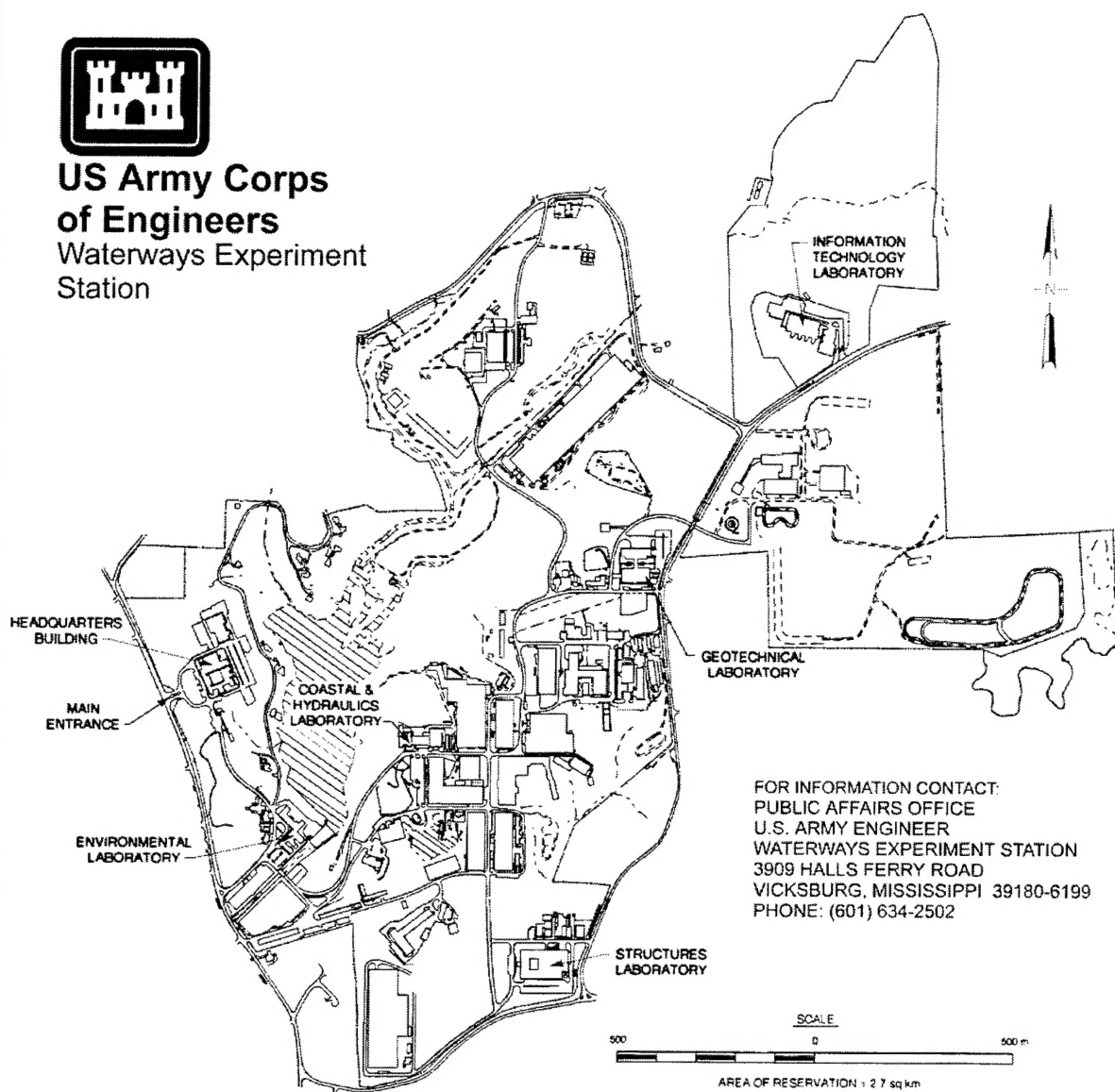
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# Preface

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The work described herein was authorized by the Strategic Environmental Research and Development Program (SERDP), Washington, DC. The work was performed under the SERDP study entitled "Regional Guidelines for Managing Threatened and Endangered Species Habitats." Dr. John Harrison was Executive Director, SERDP.

This report was modified from The Nature Conservancy's Element Stewardship Abstract (ESA) for the loggerhead shrike (*Lanius ludovicianus*) adapted from Stephen P. Hall and Harry E. LeGrand, Jr., North Carolina Natural Heritage Program, Raleigh, NC. Dr. Richard A. Fischer contributed information to this report. Dr. Fischer was employed by the Natural Resources Division (NRD), Environmental Laboratory (EL), U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS. The original ESA for the species was prepared under contract with the U.S. Army Construction Engineering Research Laboratories (CERL), Natural Resources Division, Champaign, IL, for a document titled "Integrated Endangered Species Management Recommendations for Army Installations in the Southeastern United States: Assessment of Army-Wide Guidelines for the Red-Cockaded Woodpecker on Associated Endangered, Threatened, and Candidate Species." Former drafts of the ESA were funded by the North Carolina Nongame and Endangered Wildlife Fund.

Mr. Chester O. Martin, EL, WES, and Ms. Ann-Marie Trame, Land Management Laboratory, CERL, were Principal Investigators for the regional guidelines work unit. Report review was provided by Dr. Dale E. Gawlik, South Florida Water Management District; and Dr. Eric C. Atkinson, Hawk Mountain Sanctuary, Pennsylvania. WES internal review was provided by Mr. Martin and Mr. John L. Tingle, EL.

This report was prepared under the general supervision of Dr. Michael F. Passmore, Chief, Stewardship Branch, NRD; Dr. Dave Tazik, Chief, NRD; and Dr. John Harrison, Director, EL.

At the time of publication of this report, Dr. Robert W. Whalin was Director of WES.

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## Species Profile: Loggerhead Shrike (*Lanius ludovicianus*)

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### Taxonomy

Class . . . . .	Aves
Order . . . . .	Passeriformes
Family . . . . .	Laniidae
Genus/species . . . . .	Butcherbird, white-rumped shrike, thornbird, French/Spanish mockingbird

### Description

The loggerhead shrike is one of only a few songbirds that regularly preys on other vertebrates. Shrikes show few structural modifications for predation, mainly their hooked and notched beak and relatively heavy build; otherwise, they resemble mockingbirds (*Mimus polyglottus*) in both size and plumage. They hunt from a perch and are well-known for their behavior of impaling their prey on thorns and barbed wire or wedging them into branches. The loggerhead shrike ranges in length from 20 to 25 cm (7.9 to 9.8 in.), and the wingspan is between 30 to 33 cm (11.8 to 13 in.); birds weigh up to 47 g (1.6 oz) (Eckert 1983, Pearson et al. 1959). The sexes are virtually indistinguishable from a distance, but can more readily be distinguished in the hand.

There are two subspecies of loggerhead shrikes that occur east of the Mississippi River: a migrant subspecies (*Lanius ludovicianus migrans*) and a resident subspecies (*L. l. ludovicianus*).<sup>1</sup> Adult loggerhead shrikes are generally dark blue-gray above and grayish white below, but the two subspecies differ slightly in this regard; the rarer *L. l. migrans* is paler above but grayer underneath than *L. l. ludovicianus*, and has shorter wings (Miller 1931, Pearson et al. 1959). The wings, mask, bill, and tail are basically black in all forms, except that the wings have a white patch at the base of the primaries (more restricted than that of mockingbirds, but showing more contrast with the blacker wings), and the tail is white at the tip and on the outer edges. The bill also becomes lighter colored at the base during winter.

Juvenile loggerhead shrikes are similar to adults in overall pattern, but are lighter gray above and possess faint gray barrings on their breast. Juveniles are more similar to northern shrikes (*L. excubitor*) in plumage than are the adults; but they are never as pale as that species, nor do they possess as large or as strongly hooked a bill (field guides should be consulted for critical field marks). Juvenile loggerhead shrikes can more easily be distinguished from juvenile northern shrikes, which are washed with brown and are much more heavily barred beneath.

The song of the loggerhead shrike is surprisingly melodious compared with its harsh, shrieking call notes. The song consists of low warbles interspersed with mechanical squeaking notes, the overall effect resembling the varied song of the yellow-breasted chat (*Icteria virens*) (Eckert 1983). A distinctive call given in response to territorial intruders was described by Miller (1931) as "bzeek, bzeek, bzeek."

Shrikes are easily distinguished by several other behavioral traits. They perch typically on branches, fences, or telephone wires with a commanding view of the surrounding open terrain. In flight, they usually drop down from their perches before beginning a rapid traverse low over the ground; on landing they characteristically glide upwards before perching. The flight itself consists of very rapid wingbeats.

## Similar Species

In addition to its mask, build, and more contrasting coloration, the loggerhead shrike can be distinguished from the mockingbird, as well as from other songbirds generally, by its bill, which is relatively stout and conical, hooked at the tip, and notched like that of a falcon. The legs and feet are slender like those of other perching birds. They can most easily be distinguished from mockingbirds when they are in flight; shrikes have a much more rapid wingbeat. Apart from the mockingbird, the loggerhead shrike can only be confused with its larger, paler, and more northerly congener, the northern shrike; one can consult Farrand (1983) or other field guides for distinguishing field marks.

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<sup>1</sup> Phillips (1986) recognized a third subspecies in South Florida (*L. l. miamensis*).

## Status

### Legal designation

**Federal.** The loggerhead shrike was a candidate species (C2) for listing as either threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). However, the USFWS discontinued the designation of C2 species as candidates for listing (50 CFR 17; 28 February 1996). The loggerhead shrike is considered to be a species of concern, but more biological research and field study are needed to resolve its conservation status.

**State.** The loggerhead shrike is listed as endangered in Virginia, as special concern in North Carolina and Oklahoma, and as rare in West Virginia (Hamel 1992, Yosef 1996).

### Military installations.

See Table 1.

<b>Table 1</b> <b>Known Status of Loggerhead Shrikes on Military Installations in the Southeastern United States</b>		
<b>State</b>	<b>Installation</b>	<b>Status on Installation</b>
AL	Fort McClellan; Pelham Range	Potential; "Loggerhead shrikes were not seen during the study, but probably occur in small numbers. The Large Impact and Small Arms areas seem to offer the most suitable habitat" (Alabama Natural Heritage Program 1994).
AR	Little Rock Air Force Base (AFB)	Documented onsite (Richard A. Fischer, Personal Observation, 1997).
FL	Eglin AFB	Potential.
	Avon Park Air Force Range	Documented onsite.
	Tyndall AFB	Documented onsite (Stephen Shea, Personal Communication, 1996).
	Naval Air Station Jacksonville	Documented onsite; approximately 60 individuals were observed during summer. Possibly the largest breeding population in Duval County (Sandra Maynard, Personal Communication, 1996).
	Camp Blanding	Documented onsite.
GA	Fort Gordon	Documented onsite.
	Fort Stewart	Documented onsite; nesting has been observed (Tim Beaty, Personal Communication, 1996).
	Fort Benning	Documented onsite.
LA	Fort Polk	Documented onsite; breeding population present on installation (Kenneth Moore, Personal Communication, 1997).
	Louisiana Army Ammunition Plant	Documented onsite.
<i>(Continued)</i>		



<b>Table 1. (Concluded)</b>		
<b>State</b>	<b>Installation</b>	<b>Status on Installation</b>
MS	Camp Shelby	Potential.
SC	Fort Jackson	Documented onsite.
VA	Fort Pickett	Potential; have not been located onsite (Alan Dyck, Personal Communication, 1996).

### **Distribution and numbers**

The loggerhead shrike is a strictly North American species, ranging from southern Canada to Mexico from the Pacific to Atlantic coast (Figure 1); only in high mountains and large forested areas is it completely absent. Within this range, Miller (1931) recognized 11 subspecies. More recently, Phillips (1986) recognized seven subspecies. These subspecies differ from one another only slightly in plumage, measurements, and habitat (Miller 1931). The migrant subspecies ranges from Alberta to New Brunswick and south to eastern Texas, northern Mississippi, and central Louisiana, and east to the Appalachians, including western North Carolina. In the South, the primary subspecies is the nonmigratory subspecies occurring from Virginia and North Carolina south to Florida along the Atlantic Seaboard, and west to Louisiana along the Gulf Coast (Miller 1931, Pearson et

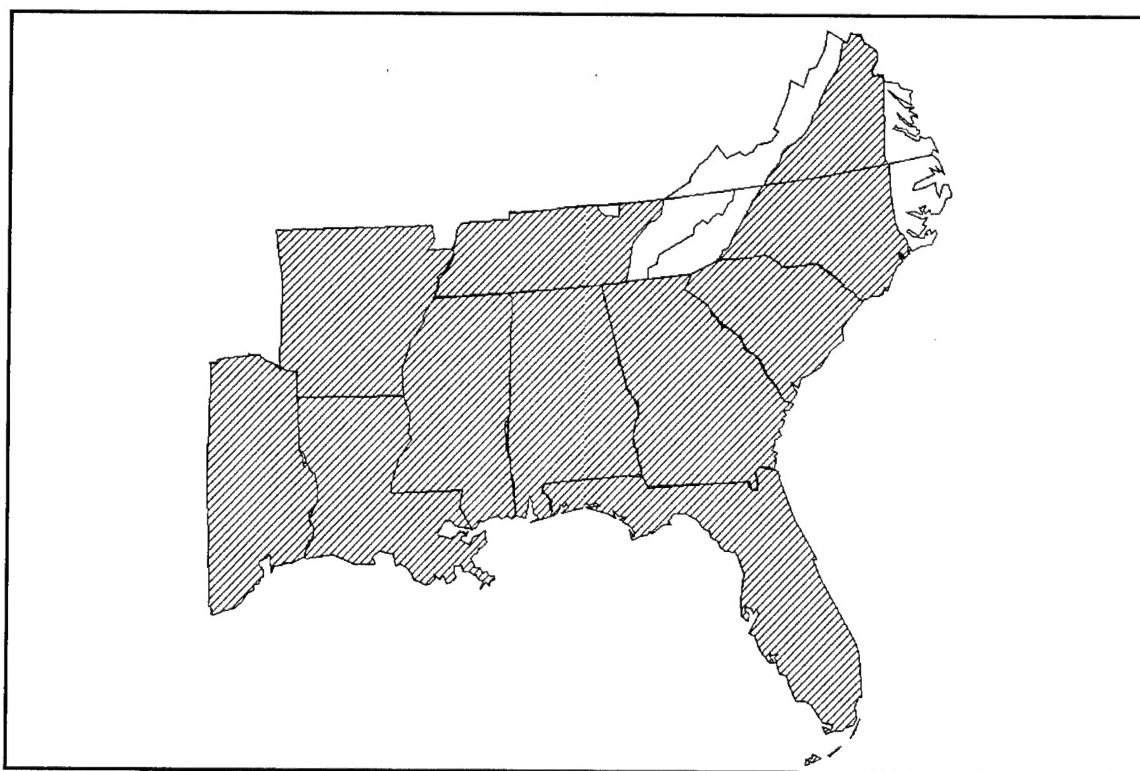


Figure 1. Approximate distribution of loggerhead shrikes in the southeastern United States (from Hamel 1992)

al. 1959). The migrant subspecies has declined more than the resident subspecies, primarily from Virginia to Florida (Bystrak 1983, Cadman 1985, Yosef et al. 1993).

Shrike populations have been in slow decline throughout their range in midwestern New England and mid-Atlantic States (Bystrak and Robbins 1977, Hess 1980, Morrison 1981, Burnside and Shepherd 1985, Peterjohn and Sauer 1995), but recently these losses have accelerated dramatically: a 4-percent annual decline has occurred overall since 1978, with as much as a 60-percent reduction observed in Missouri between 1967 and 1979 and complete extirpation occurring elsewhere (Fraser and Luukkonen 1986).

In North Carolina, the resident subspecies is the more widespread form and is a permanent resident from the Piedmont to the Coastal Plain. It is rare to absent over much of the northern and eastern portions of the Coastal Plain (Pearson et al. 1959, Potter et al. 1980). The migrant subspecies appears to be restricted to the western part of the State during the breeding season (this population may actually represent an intergrade between *ludovicianus* and true *migrans* (Miller 1931)). In winter it becomes more frequent throughout the State, most of the northern populations in the east migrating southward from areas that become covered by snow 10 or more days (Miller 1931); nonetheless, it still appears to be only an uncommon visitor compared with the more numerous and resident *L. l. ludovicianus* (Pearson et al. 1959).

## Life History and Ecology

### Reproduction and development

Loggerhead shrikes, especially the resident populations, breed earlier than most other songbird species; mating begins as early as February and March in parts of the South (Fraser and Luukkonen 1986), and in North Carolina the peak in laying occurs in April (Potter et al. 1980). The breeding season for the North Carolina population of *L. l. migrans* is probably similar, but the migratory populations head northward to breeding grounds mainly from early April to May; they return as soon as late summer or early fall (Pearson et al. 1959). As is true for most songbirds, the loggerhead shrike is strongly territorial during the breeding season with pairs defending a large foraging and roosting area as well as the nest site itself. Like the mockingbird, they also defend individual territories during the winter, both against conspecifics and other competing species (Miller 1931, Fraser and Luukkonen 1986).

Loggerhead shrikes exhibit seasonal monogamy; males show more fidelity to nesting sites than do females (Kridelbaugh 1983). The male, as in many raptor and owl species, provides food for the female while she is incubating the eggs. Incubation apparently is performed only by the female (Fraser and Luukkonen 1986). Clutch size ranges from 3 to 7, with means varying between 4.4 to 6.4 (Kridelbaugh 1983, Tyler 1995). The first clutch of the season is typically the largest with one fewer egg occurring in each subsequent clutch (Potter et al. 1980). Incubation is relatively long compared with other songbirds, ranging between 13 and 20 days with a mean of 17 days (Potter et al. 1980,

Kridelbaugh 1983, Tyler 1995). Observed hatching success rates range from 79.5 to 84.7 percent (Kridelbaugh 1983, Tyler 1995).

Loggerhead shrikes will renest if the first nest is lost to predators or adverse weather, and they typically have multiple broods (Fraser and Luukkonen 1986). In North Carolina, two clutches are normally raised per year, but three are often raised in South Carolina (Potter et al. 1980). While both parents feed the nestlings, females may flee or initiate a second nest before the fledglings become independent, leaving the male as the sole provider (Kridelbaugh 1983).

Fledging takes place from 17 to 21 days after hatching (Kridelbaugh 1983). Overall nesting success (number of nests producing at least one fledgling) ranged from 43 to 80 percent in Missouri (Kridelbaugh 1983). Mortality due to starvation of the youngest nestling is frequently observed as are losses due to predation (particularly by snakes) and adverse weather (Kridelbaugh 1983).

Postfledging dependency lasts from 3 to 4 weeks (Kridelbaugh 1983, Fraser and Luukkonen 1986). Survival rates for first-year birds and adults are unknown, but loggerhead shrikes have been documented to live as long as 6 years in the wild (Kennard 1975). Like other songbirds, some individuals attempt to breed when 1 year old (Woods 1995; Dale E. Gawlik, Personal Communication, 1996).

### Food habits and foraging

Other than corvids (i.e., crows, jays, magpies), shrikes are the only North American songbird that regularly preys on other vertebrates and are well-known for their habit of impaling mice, shrews, small birds, lizards, and snakes on thorns or barbed wire (Figure 2). The adaptive significance of this behavior is not fully understood; but Safriel (1995)



Figure 2. Loggerhead shrikes often impale prey on barbed wire or tree/shrub spines (Photo by Kelly Mizell)

speculated that while shrikes have a raptorial bill, they lack other anatomical features of raptors such as strong feet and talons for handling prey, and a crop that would allow them to swallow prey whole. The functions of impaling may include enabling shrikes to immobilize large prey (Smith 1972), having a food cache in case of food shortages, or to display the male's ability to capture prey or find and maintain a quality territory. In addition,

impaled prey that are potentially chemically toxic can detoxify with time and be consumed later when safer to eat (Yosef and Whitman 1992, Safriel 1995).

Prey can be as large as full-grown cotton rats (*Sigmodon hispidus*), but insects probably constitute the bulk of their diet, particularly during the breeding season when grasshoppers are abundant; conversely, vertebrates become the main prey during winter (Miller 1931, Fraser and Luukkonen 1986). Shrikes will capture prey flushed by farm machinery (Caldwell 1986) and will forage in plowed or mowed fields shortly after disturbance (Gawlik and Bildstein 1990). In South Carolina, a pair of loggerhead shrikes delivered both vertebrate (4 percent) and invertebrate (96 percent) prey to nestlings. The majority of observed invertebrates were Orthopterans (grasshoppers), Coleopterans (beetles), and Lepidopterans (moths/butterflies). The male and female both contributed equally to feeding nestlings (Gawlik et al. 1991).

## Habitat Requirements

Shrikes are characteristically birds of open country (e.g., pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands (Yosef 1996)). They occur from deserts and prairies in the West to pastures and fields in the East. Longleaf pine (*Pinus palustris*) savannas and open, mature stands of loblolly pine (*P. taeda*)-shortleaf pine (*P. echinata*) also provide suitable habitat for the shrike in the Southeast (Hamel 1992).

Nesting and perching requirements mainly include shrubs and low trees; where these are absent, as in pure prairie habitat, shrikes often are absent. However, Chavez-Ramirez et al. (1994) found that when fence posts were removed in a natural grassland during the nonbreeding season, shrikes compensated for woody perch loss by perching on herbaceous forbs and grasses. Woody vegetation is probably much more critical in an agricultural landscape where suitable perches are restricted to field edges (Dale E. Gawlik, Personal Communication, 1996).

Breeding shrikes often settle near isolated trees or large shrubs (Yosef 1994). Short grassy habitats (e.g., grazed pasture) are important to nesting shrikes (Kridelbaugh 1983, Gawlik and Bildstein 1990), and shrikes breeding and nesting in this type of habitat have higher productivity than in other habitats (Luukkonen 1987, Gawlik and Bildstein 1990). Nests are built in a variety of trees, shrubs, and vines from 1 to 6 m (3.3 to 20 ft) above the ground (Fraser and Luukkonen 1986). In South Carolina, Gawlik and Bildstein (1990) found loggerhead shrikes nesting more frequently in red cedar (*Juniperus virginia*) than other available tree species; Luukkonen (1987) observed shrikes using red cedar and hawthorn (*Crateagus* spp.) more than expected in a Virginia study. Luukkonen (1987) suggested that nests in cedar and hawthorne provided more concealment cover than nests in other shrub species. Nests in proximity to pasture (e.g., within 100 m (328 ft)) were more productive than nests located farther from pasture (Luukkonen 1987, Gawlik and Bildstein 1990). In South Carolina, both lawns and pastures were used heavily and

provided the majority of habitat within 100 m of nests (Gawlik and Bildstein 1990). Gawlik and Bildstein (1990) noted the importance of lawns, pastures, and hayfields because they provide (a) permanent grassland (i.e., land not tilled regularly), (b) routine disturbances by mowing and grazing, and (c) lower vegetation than similar undisturbed grassy habitats. Shrikes generally avoid rowcrops for nesting (Kridelbaugh 1982) but have been observed using rowcrops in autumn, presumably because of a shift in food availability (Gawlik and Bildstein 1993).

## **Habitat Assessment Techniques**

Little information was available in the literature to adequately describe any habitat assessment techniques.

## **Inventory and Monitoring**

A systematic survey of breeding and nesting shrikes is urgently needed throughout the Southeast (Fraser and Luukkonen 1986). Shrikes may provide a simple and inexpensive indicator of habitat quality because of their conspicuousness and types of open habitats they inhabit (Safriel 1995). On military installations, surveys along roads offer the best approach for censusing this species. Searches for nesting pairs should be conducted in shrubby pastures or fields from early March through June. Once located, nest areas should be checked annually since they are often reused. Winter territories are also good indicators of where to search during the subsequent breeding season; but since the migrant subspecies also establishes winter territories, winter sightings are not as useful as those made during the breeding season.

## **Impacts and Cause of Decline**

### **Agricultural practices**

Several factors appear to be involved in the decline of loggerhead shrike populations, although no one factor appears to be entirely responsible for the decline. The initial and more gradual cause may be the conversion of agriculture to "clean" farming techniques and the planting of large fields. A key habitat requirement for the shrike is the presence of shrubs, both for nesting and for hunting lookouts. The destruction of hedgerows and windbreaks accompanying the development of large farm machinery, especially since the 1960s, probably represented a significant loss of habitat for this species. This has also been implicated in declines of bobwhite quail (*Colinus virginianus*), cottontail rabbits (*Sylvilagus floridanus*), and other species formerly abundant in agricultural areas. Brooks and Temple (1990), however, found that most studies conducted on breeding shrikes concluded that the availability of breeding habitat is not a limiting factor. Much

suitable breeding habitat is unoccupied, suggesting other factors are contributing to the species decline.

## **Pesticides**

Given the loggerhead shrike's diet of birds, as well as crop-feeding insects, pesticides have also been implicated in their decline. However, the required concentrations to actually affect populations is not fully understood (Yosef 1996). As in other raptorial birds, residues of DDE and other organochlorines have been found in the tissues of adult shrikes, and eggshell thinning has also been demonstrated since the widespread use of DDT began in the late 1940s (Anderson and Duzan 1978). Nonetheless, reproductive rates have remained high even in populations undergoing declines, and the crushed eggs typical of organochlorine contamination in peregrine falcons (*Falco peregrinus*) and Accipiters have not been observed as conspicuously in shrikes (Anderson and Duzan 1978, Fraser and Luukkonen 1986). Furthermore, shrike populations have continued to decline even after the banning of organochlorines in the United States in 1972, in sharp contrast to the recoveries seen in other impacted species. Busbee (1977) found that, in experimental tests, young shrikes given daily doses of dieldrin died from 16 to 78 days after poisoning, depending on dosage. Thus, the decline in shrikes might be partly a function of death of immature birds from pesticides, even if reproductive success appears unaffected.

While the effects of these potential impacts seem ambiguous, some combination of pesticide effects and habitat loss seems to be the only possible explanation for the decline of shrike populations. Although the exact role of pesticides has not been determined, direct effects on both adults and juveniles, particularly from dieldrin poisoning, have been observed, and may act particularly during migration or other times of stress when observations of mortality are difficult to obtain (Anderson and Duzan 1978, Fraser and Luukkonen 1986).

## **Collision with vehicles**

A small percentage of shrike mortality has been attributed to collisions with vehicles; shrikes often forage and nest along roads, which makes them susceptible to collisions. A number of studies have noted road-killed shrikes contributing up to 18 percent of known mortalities.

## **Cowbird parasitism**

There is little information in the literature regarding nest parasitism on shrikes by brown-headed cowbirds (*Molothrus ater*). However, there is speculation that shrike nests are rarely parasitized because of the shrikes' aggressive and predatory nature (Friedmann 1963). DeGeus and Best (1991) were the first to report cowbird parasitism and adult loggerhead shrikes rearing cowbird young. This study was conducted in Iowa, and no known incidences of parasitism have been reported in the southeastern United States.



## Management and Protection

Management schemes for this species should include the use of the traditional methods of small family farming, including the use of smaller fields, the retention of hedgerows and windbreaks, the rotation of crops with pasturage, and decreased pesticide use. Measures can also be directed toward increasing prevalence of medium and tall grass (Yosef and Grubb 1993) by decreasing grazing and mowing of grasslands and fencing of shelterbelts to protect from cattle (Yosef 1996). Since loggerhead shrikes in the eastern States are primarily found in agricultural areas, protection through acquisition of critical habitat is often precluded. Landowners adjacent to installations should be alerted of the presence of shrikes on their property and to encourage them to retain hedgerows and windbreaks and to avoid the heavy use of pesticides if possible. Shrikes often are associated with and reproduce well in residential and commercial areas. According to Dale E. Gawlik (Personal Communication, 1996), open areas surrounding buildings, roadways, and other buildings in cantonment areas of military installations should not be overlooked for shrike management. These areas may provide the open grassy habitat (although it may be a mowed lawn) commonly used by shrikes. By strategically placing native shrubs and trees (including those with thorns) to maximize foraging and nesting habitat availability, shrikes may be attracted to such sites in cantonment areas.

Off-road traffic should be limited, as it can be deleterious to ground cover, soil structure, and hydrologic patterns. Where off-road traffic is unavoidable, it should especially be limited in shrubby areas within the pine savanna, particularly during the shrike breeding season. To decrease the potential for vehicle strikes, signs can be posted during the nesting season along roadways having documented nesting areas adjacent to the road.

Shrikes may inhabit open forests, though these habitats are not considered high-quality habitat when compared with grasslands or savannas. The following sections from Jordan et al. (1995) address the influence of red-cockaded woodpecker (RCW) (*Picoides borealis*) management in open pine forests on loggerhead shrikes.

### Prescribed burning

Prescribed fire that mimics the natural fire return interval is highly desirable for the maintenance and improvement of loggerhead shrike habitat in pine forests because it acts to reduce the shrub and midstory woody vegetation and promotes a well-established herbaceous layer (which, in turn, benefits the shrike's prey). Spring burning can be problematic since the shrike breeds very early in the spring (beginning in February). However, shrikes may renest if disturbed. Once a burn regime has been established, growing season burns conducted after the breeding season will promote the open habitats preferred by the species.

Natural fire breaks (topographic features, wetland boundaries) should be favored over artificial means of controlling fire, since use of natural breaks would more closely mimic natural ecosystem processes. Fire management should include an awareness of the potential for loggerhead shrike nesting along the shrubby margins between savannas and pocosins

and along hardwood stringers. Use of heavy equipment to construct berms or fire lanes should be minimized to avoid negative impacts to ground layer vegetation and soil stability.

### **Hardwood control and pine thinning**

In general, the hardwood and pine thinning guidelines for the RCW (U.S. Army Construction Engineering Laboratories 1994) should benefit the loggerhead shrike. Chemical and mechanical methods of hardwood control should employ best management practices to avoid soil disturbance, destruction of ground-layer vegetation, and nontarget effects of herbicides. The shrike requires scattered shrubby vegetation for nesting, so that some scattered shrub and sapling hardwoods should be retained in the overall savanna matrix.

### **Erosion control**

Concerted efforts to reduce and prevent soil erosion within RCW Habitat Management Units, or other areas in suitable habitat, would have a beneficial effect on loggerhead shrike habitats by maintaining the integrity of herbaceous layers used by shrike prey populations. When controlling erosion, use of planted native vegetation should be used wherever possible instead of non-native species. When using mechanical means of erosion control, the natural contours of the surrounding topography should be maintained to ensure the integrity of natural hydrologic processes.

### **Longleaf pine regeneration**

In general, reestablishment of longleaf pine and the regeneration of existing longleaf pine stands would increase the available open woodland habitats for the loggerhead shrike. Natural regeneration methods should be used whenever possible. Site preparation, if necessary, should employ fire rather than mechanical methods such as discing or chopping, as fire may favor shrike prey populations.

### **Extractive land uses**

Pine straw raking may destroy ground-layer vegetation and longleaf pine seedlings and cause or exacerbate erosion problems. In the long term, removal of pine-straw fuels also may alter fire regimes by reducing fuel loads. All of these potential effects would have negative impacts on both the open, savanna habitats used by loggerhead shrikes and the groundlayer vegetation upon which the shrike's prey depends for refugia. Timber harvest strategies that shift forest stands toward longer rotations and replace offsite pines and hardwoods with longleaf pine should restore natural fire and hydrologic regimes and nutrient dynamics in plant communities. Forest management should minimize adverse impacts to wiregrass (*Aristida stricta*) and other herbaceous ground-layer species.



## Habitat Protection and Species Recovery

A reversion to older agricultural techniques (e.g., small fields with grassy pastures, hedgerows, and trees) and the elimination of wide-spectrum pesticides would seem necessary for recovery, but also extremely unlikely to occur. Gawlik (Personal Communication, 1996) suggested that changing landuse from agriculture to forest in the Southeast is posing a problem for shrike recovery. The recovery potential for this species is difficult to assess in absence of clear causes for their decline.

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<b>13. ABSTRACT (Maximum 200 words)</b>  The loggerhead shrike ( <i>Lanius ludovicianus</i> ) is a strictly North American passerine experiencing population declines throughout its range. It is a former candidate for listing as Threatened or Endangered by the U.S. Fish and Wildlife Service. Shrikes are well-known for their behavior of impaling their prey on thorns and barbed wire. There are two subspecies that occur east of the Mississippi River, a resident subspecies and a rarer migrant subspecies. Shrikes breed throughout the southeastern United States, except for the Appalachian Mountain region and the eastern portions of North Carolina and Virginia. Loggerhead shrikes prefer open country, such as pastures with fence rows, old orchards, and mowed roadsides, where they feed on a variety of vertebrate and invertebrate prey. Longleaf pine savannas and open, mature stands of loblolly pine-shortleaf pine also provide suitable habitat for the shrike in the Southeast. Shrikes have been documented and are locally common on several military installations in the Southeast. This report is one of a series of "Species Profiles" being developed for threatened, endangered, and sensitive species inhabiting southeastern United States plant communities. The work is being conducted as part of the Department of Defense (DoD) Strategic Environmental Research and Development Program (SERDP). The report is designed to supplement information provided in plant community management reports for major United States plant communities found on military installations. Information provided on the loggerhead shrike includes status, life history and ecology, habitat requirements, impacts and cause of decline, management and protection, and inventory and monitoring.						
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